REMARKS/ARGUMENTS

Claims 1-38 are pending in the application. Claims 1-3, 6-7, 9-13, 16-24, 28-29, and 31-38 are amended herein. The Applicant hereby requests further examination and reconsideration of the application in view of the foregoing amendments and these remarks.

Claims 1-3, 6-7, 9-13, 16-24, 28-29, and 31-38 have been amended to ensure proper antecedent basis and to otherwise conform to the dictates of 35 U.S.C. 112, second paragraph. None of these amendments have been made to overcome any prior-art rejections.

In paragraph 1 of the office action, the Examiner objected to the drawings "because numerous handwritten captions in the drawings." In response, the Applicant submits herewith a corresponding set of formal drawings that do not have any handwritten captions. The Applicant submits that this overcomes the Examiner's objection to the drawings.

In paragraph 2, the Examiner rejected claims 1-3, 9, 18, 21-22, 24-26, and 36-37 under 35 U.S.C. 103(a) as being unpatentable over Sommer. In paragraph 3, the Examiner objected to claims 4-8, 10-17, 19-20, 23, 27-35, and 38 as being dependent upon a rejected base claim, but indicated that those claims would be allowable if rewritten in independent form. For the following reasons, the Applicant submits that all of the now-pending claims are allowable over Sommer.

Currently amended claim 1 is directed to an apparatus for applying equalization to a complex-valued received signal. The claimed apparatus comprises a linear predictive (LPR) filter, an equalizer, and an error term calculator.

The LPR filter is characterized by a set of real-valued LPR parameters applied to the received signal, wherein the set of LPR parameters are recursively updated based on one or more error terms to minimize output power of the LPR-filtered signal.

The equalizer is configurable as either a linear equalizer (LE) or a decision feedback equalizer (DFE) and applies an estimate of the inverse channel characteristics to the received signal to generate an equalized signal. The equalizer comprises a forward (FW) filter characterized by a set of FW parameters, a feedback (FB) filter characterized by a set of real-valued FB parameters, and a decision circuit generating hard decisions for the data of the equalized signal. The set of real-valued FB parameters are initialized by the set of real-valued LPR parameters, the set of FW parameters are initialized with either values of a predetermined impulse response or values based on a function of a channel response, and the set of FW parameters and the set of FB parameters are recursively updated based on one or more error terms.

The error term calculator is configured to generate the one or more error terms from one or more blind cost criteria based on real-part extraction.

For the following reasons, the Applicant submits that Sommer does not teach or even suggest such a combination of features.

First of all, according to claim 1, the apparatus includes an LPR filter and an equalizer that itself includes a forward filter and a feedback filter, where the FB parameters for the feedback filter are initialized by the LPR parameters for the LPR filter. Sommer teaches an apparatus having (i) a number of feed forward equalizer (FFE) sections and (ii) a number of decision feedback equalizer (DFE)

sections. Significantly, however, Sommer does not teach or even suggest an LPR filter that provides LPR parameters for initializing the parameters of a feedback filter.

In rejecting claim 1, the Examiner admitted that Sommer does not teach "an independent LPR filter." Nevertheless, the Examiner rejected claim 1 claiming that the LPR function "is addressed by the feedforward portion of Sommer's invention," citing column 4, lines 40-52. However, Sommer does not teach, in either column 4, lines 40-52, or anywhere else, that the coefficients of Sommer's DFE sections are initialized based on the coefficients of Sommer's FFE sections. As such, Sommer does not teach the LPR function that is explicitly recited in claim 1.

Second, according to claim 1, the apparatus applies equalization to a complex-valued received signal using LPR and FB filters whose parameters are real-valued. In rejecting claim 1, the Examiner stated that Sommer teaches "an apparatus for applying equalization to a complex valued signal," where the apparatus comprises a linear predictive filter "characterized by a set of real-valued LPR parameters," citing column 3, lines 30-39, and column 13, lines 28-31.

In column 3, lines 30-39, other than mentioning QAM, VSB, and PAM, Sommer does not say anything about whether the received signal being equalized and/or the equalizer's filter parameters are complex-valued or real-valued. Significantly, in column 13, lines 28-33, Sommer states that: "It is important to note that the equalizer of the present invention has applications in a Vestigial Side Band (VSB) receiver, in which case all the signals and the coefficients are real valued, and in a QAM, PSK, or CAP receiver, in which case the signals and the coefficients of the equalizer are complex valued." Thus, according to Sommer, either the signals and the coefficients are all real-valued or the signals and the coefficients are all complex-valued. Sommer does not teach or even suggest an application where signals (e.g., the received signal of claim 1) are complex-valued and coefficients (e.g., the LPR and FB filter parameters of claim 1) are real-valued, as in claim 1. If anything, Sommer explicitly teaches away from the invention of claim 1 in this regard.

Third, according to claim 1, the LPR, FW, and FB parameters are all recursively updated based on error terms. In rejecting claim 1, the Examiner stated that Sommer teaches recursive updating, citing signal 61 in Fig. 3; column 1, line 63, to column 2, line 3; and column 2, lines 21-36, as teaching the equivalent of recursive updating of filter parameters. While the Applicant admits that Sommer teaches updating of coefficients for Sommer's FFE and DFE sections, Sommer does not teach recursive updating of those filter parameters.

The Applicant provides an example of the recursive updating of filter parameters recited in claim 1 in the formulas of Equation (5) in the specification. As indicated in those formulas and as understood by those of ordinary skill in the art, a recursive formula is one that "calls itself." For example, in the first formula of Equation (5), the function $f_j(n)$ is part of the definition of the function $f_j(n+1)$. In that respect, a recursive function is said to call itself.

Not only does Sommer not teach any such recursive formulas for updating his filter parameters, Sommer does not even mention the word "recursive" anywhere in the reference. At best, Sommer teaches iterative updating of filter parameters, which is very different from the recursive updating of claim 1.

Fourth, according to claim 1, the error term calculator is configured to generate the one or more error terms from one or more blind cost criteria based on real-part extraction. In rejecting claim 1, the Examiner completely ignored the explicit recitation of real-part extraction in claim 1. This "oversight" by the Examiner is significant because, in fact, Sommer does not teach or even suggest such a feature.

For each of these reasons separately and for all of these reasons combined, the Applicant submits that Sommer does not teach or even suggest the combination of features explicitly recited in claim 1. As such, the Applicant submits that claim 1 is allowable over Sommer. For similar reasons, the Applicant submits that claim 24 is allowable over Sommer. Since the rest of the claims depend variously from claims 1 and 24, it is further submitted that those claims are also allowable over Sommer. The Applicant submits therefore that the rejections of claims under Section 103(a) have been overcome.

In view of the above amendments and remarks, the Applicant believes that the now-pending claims are in condition for allowance. Therefore, the Applicant believes that the entire application is now in condition for allowance, and early and favorable action is respectfully solicited.

Respectfully submitted,

Date: 8/26/05

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